

INVESTIGATING DOUBLED AIRCRAFT INSPECTION FREQUENCY STRATEGY FOR EXPONENTIAL FATIGUE CRACK GROWTH MODEL

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Abstract

In this article information about the discovered airframe fatigue cracks is used for further aircraft inspection program development. One of the strategies -switching to doubled aircraft inspection frequency - has been investigated for exponential fatigue crack growth model with fixed initial equivalent crack size. Doubled aircraft inspection strategy is the simplest example of the set of strategies with variable interval between inspections, which are investigated later. Monte-Carlo modeling was performed to simulate fatigue crack growing process and Markov Chain theory methodologies were applied to calculate finite probabilities of success (crack detection in-time) and failure (crack was missed) situations for ordinary and modified inspection strategies. Modified Markov transition probability matrix is used as a basis for calculations of resulting failure probability for the whole “switching to doubled inspection frequency” strategy. It has been shown, that switching for the double-speed inspection program after the fatigue crack discovery slightly increases the level of failure probability, but at the same time allows prolongation of aircraft service period, which has significant economic effect.